Youth Connect

Youth Community Resilience to Climate Change in the Mekong Delta (Y-CoRe)

Building a model of land crop rotation (quinoa) combined with irrigation management using Chameleon soil moisture sensors on saline rice soil in the Mekong Delta under net house conditions

Project background

In recent years climate change has been causing serious saltwater intrusion and irrigation water shortages in the Mekong Delta, increasingly forcing local farmers to face adverse conditions such as prolonged droughts, erratic rainfall patterns, and expanding areas of saline intrusion. Simultaneously, farmers' health is being affected by environmental factors such as pesticide residues. These pressures lead to either migration in search of new jobs or a struggle to maintain traditional farming practices that are no longer suitable under current conditions.

Project objectives

The project aimed to:

- assess the growth and development potential of quinoa on saline-intruded rice land and the effectiveness of water-saving irrigation using Chameleon moisture sensors under greenhouse conditions

- provide initial insights into the feasibility of cultivating this crop in the Mekong Delta's drought- and salt-affected conditions, and support crop diversification in the region
- lay the foundation for replicating and scaling up this new crop (quinoa) and innovative irrigation method (Chameleon soil moisture sensors), offering farmers more options during the dry season when fields are fallow due to salinity and water scarcity
- contribute to income improvement and economic stability for farmers and reduce migration caused by unviable rice cultivation under climate change – particularly salinity intrusion – in the Mekong Delta.

Project overview

Survey, Soil Sample Collection, and Experimental Setup in the Greenhouse

Soil samples were collected from Lieu Tu commune, Tran De district, Soc Trang province. This is an area with high risk and vulnerability to saltwater intrusion during the dry season. The soil was collected from a depth of 0–20cm (topsoil layer). Afterward, the soil was transported to the greenhouse for treatment. The soil was crushed into smaller pieces (1–2cm in diameter), plant residues were removed, lime was applied, and disease pathogens were treated. The soil was then sun-dried outside the greenhouse for three to five days. Once completely dried, it was thoroughly mixed and placed into plastic pots for experimental setup. Each pot contained 7–10kg of soil.

After homogenising the soil, representative samples were collected to determine the initial soil properties before cultivation. These were combined into a composite sample of approximately 0.5kg for nutrient content analysis. The characteristics to be measured included soil pH, EC (electrical conductivity), total nitrogen (N), and available phosphorus (P). Soil sample analysis was carried out at the laboratory of the College of Agriculture, Can Tho University.

Assessment of Quinoa Growth under Different Salinity Levels in Irrigation Water and Evaluation of the Efficiency of the Chameleon Soil Moisture Sensor-Based Irrigation Method

The experiment was arranged in a randomised design with two factors and three replications:

- Factor 1: Irrigation frequency and method, including (1) Farmer's conventional irrigation (once/day); (2) Irrigation based on Chameleon soil moisture sensor (following the sensor's colour indicators)
- Factor 2: Salinity levels of irrigation water, including (1) Freshwater (no salinity); (2) 2 per cent salinity; (3) 4 per cent salinity; (4) 6 per cent salinity.

The quinoa plants were irrigated with saline water from one month after sowing until harvest. NPK fertiliser was applied based on recommendations from the research team at the Faculty of Soil Science, College of Agriculture:

- Monitoring indicators in the soil: EC, pH, soil moisture, available nitrogen, and available phosphorus
- Plant indicators: Plant height at key growth stages, biomass, and grain yield at harvest.

Outstanding outcomes:

The project identified suitable cultivation practices for quinoa on saline-intruded soil in the Mekong Delta under greenhouse conditions, and successfully evaluated the effectiveness of the water-saving irrigation method using Chameleon soil moisture sensors.

Team member's information

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